hp-ADAPTIVE BEM FOR WEAKLY SINGULAR OPERATORS

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We present an adaptive refinement strategy for the *hp*-version of the boundary element method for the solution of weakly singular integral equations on piecewise plane surfaces. The meshes may consist of triangles and quadrilaterals. Our error indicators are based on solving local problems on individual elements with increased polynomial degrees.

Essential ingredient in the analysis of the corresponding error estimator is the stability of the underlying subspace decomposition. Decoupling of standard basis functions in the *p*-version leads to unstable decompositions. To avoid this, when not using special basis functions, one has to perform a Schur complement step. This step amounts to a basis transformation that orthogonalizes the corresponding subspaces. For the boundary element method, where one deals with dense matrices for standard basis functions, this step is expensive. We therefore propose to perform a partial orthogonalization that neglects the coupling of basis functions associated with different elements. Assuming a saturation property and locally quasi-uniform meshes, efficiency and reliability of the resulting error estimator is proved.

The performance of the algorithm and the estimator is demonstrated for a model problem.